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## Section 6 MANAGEMENT

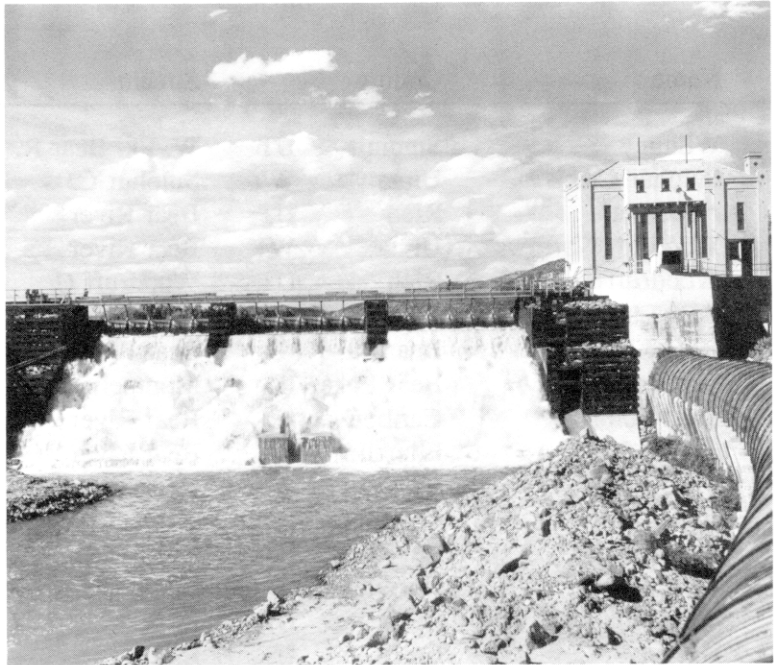
This section describes the existing water management systems in the basin for irrigation, municipal, industrial, and waterfowl use. The cloud seeding program is discussed, management organizations are listed, and a general recommendation is made.

### 6.1 INTRODUCTION

For purposes of this report, "management" is defined as the responsibility for control, augmentation, and use of a water supply, including storage and release, diversion, distribution, and treatment. Management for water quality, fisheries, conservation, and groundwater use, are covered in other sections of this report. Most of the local management of water supplies throughout the Bear River Basin consists of irrigation management, in terms of water supply quantities as well as numbers of managing entities. The most common entities are mutual irrigation companies. A few of the larger companies are listed.

### 6.2 OVERALL MANAGEMENT OF THE BEAR RIVER SYSTEM

The Bear River is not managed as an entire stream system on a unified basis, although provisions of the Bear River Compact are the basis for all river operations in the



Grace Dam, 1950 - UP&L

three states. The major operator is Utah Power & Light Co. (UP&L). However, UP&L has no operations in the upper basin above Bear Lake. Below Bear Lake, flows of the mainstem are regulated by UP&L for its own use and others. Under a set of contracts, court decrees, and the Bear River Compact, UP&L operates Bear Lake and the river downstream, not only for hydropower generation but also for irrigation and to some extent for flood control and recreation. A series of three mainstem dams and seven hydroelectric power plants provide UP&L with a mainstem generating capacity of nearly 117 megawatts. These and other existing reservoirs and power plants in the

basin are listed for reference in Tables 6-1 and 6-2. In Table 6-1, about 9 megawatts of capacity is for non-UP&L powerplants. Power plant locations are shown in Figure 6-1.

Above Bear Lake, river flows are managed almost entirely for irrigation. Mainstem storage regulation is provided by Woodruff Narrows Reservoir near the Wyoming-Utah state line below Evanston, so

**TABLE 6-1**  
**EXISTING RESERVOIRS IN BEAR RIVER BASIN<sup>2,a</sup>**  
(in downstream order)

Name	County		Stream	Owner or Operator	Total Storage (acre-feet)
Whitney	Summit	UT	W. Fk. Bear R.		4,700
Sulphur Creek	Uinta	WY	Sulphur C.		19,800
Neponset <sup>b</sup>	Rich	UT	Bear River		6,900
Woodruff Narrows	Uinta	WY	Bear River	<sup>c</sup>	57,300
Woodruff Creek	Rich	UT	Woodruff C.		4,100
Bear Lake <sup>b</sup>	Rich	UT	Bear River	UP&L	1,452,000 <sup>b</sup>
	Bear Lake	ID	Bear River		
Montpelier	Bear Lake	ID	Montpelier C.		4,050
Soda Point	Caribou	ID	Bear River	UP&L	15,500
Oneida Narrows	Franklin	ID	Bear River	UP&L	11,500
Twin Lakes <sup>b</sup>	Franklin	ID	Mink Creek		14,000
Glendale	Franklin	ID	Worm Creek		11,000
Strong Arm	Franklin	ID	Battle C.		4,500
Treasureton	Franklin	ID	Battle Creek		7,000
Porcupine	Cache	UT	E.Fk. Little B.R.	<sup>e</sup>	12,800
Hyrum	Cache	UT	L. Bear R.	USBR <sup>f</sup>	18,800
Newton	Cache	UT	Newton Creek	USBR <sup>g</sup>	5,600
Cutler	Box Elder	UT	Bear River	UP&L	17,000
Mantua	Box Elder	UT	Box Elder C.	Brigham City	7,560
Daniels	Oneida	ID	L. Malad R.	<sup>h</sup>	11,900
Deep Creek	Oneida	ID	Deep Creek		5,400
Devil Creek	Oneida	ID	Devil C.		4,450
St. Johns	Oneida	ID	Davis C.		4,450

<sup>a</sup>With storage capacities greater than 4,000 acre-feet.

<sup>b</sup>Off-channel.

<sup>c</sup>Woodruff Narrows Reservoir Co.

<sup>d</sup>Off-channel location. Includes 31,000 acre-feet in Mud Lake.

<sup>e</sup>Porcupine Reservoir Co.

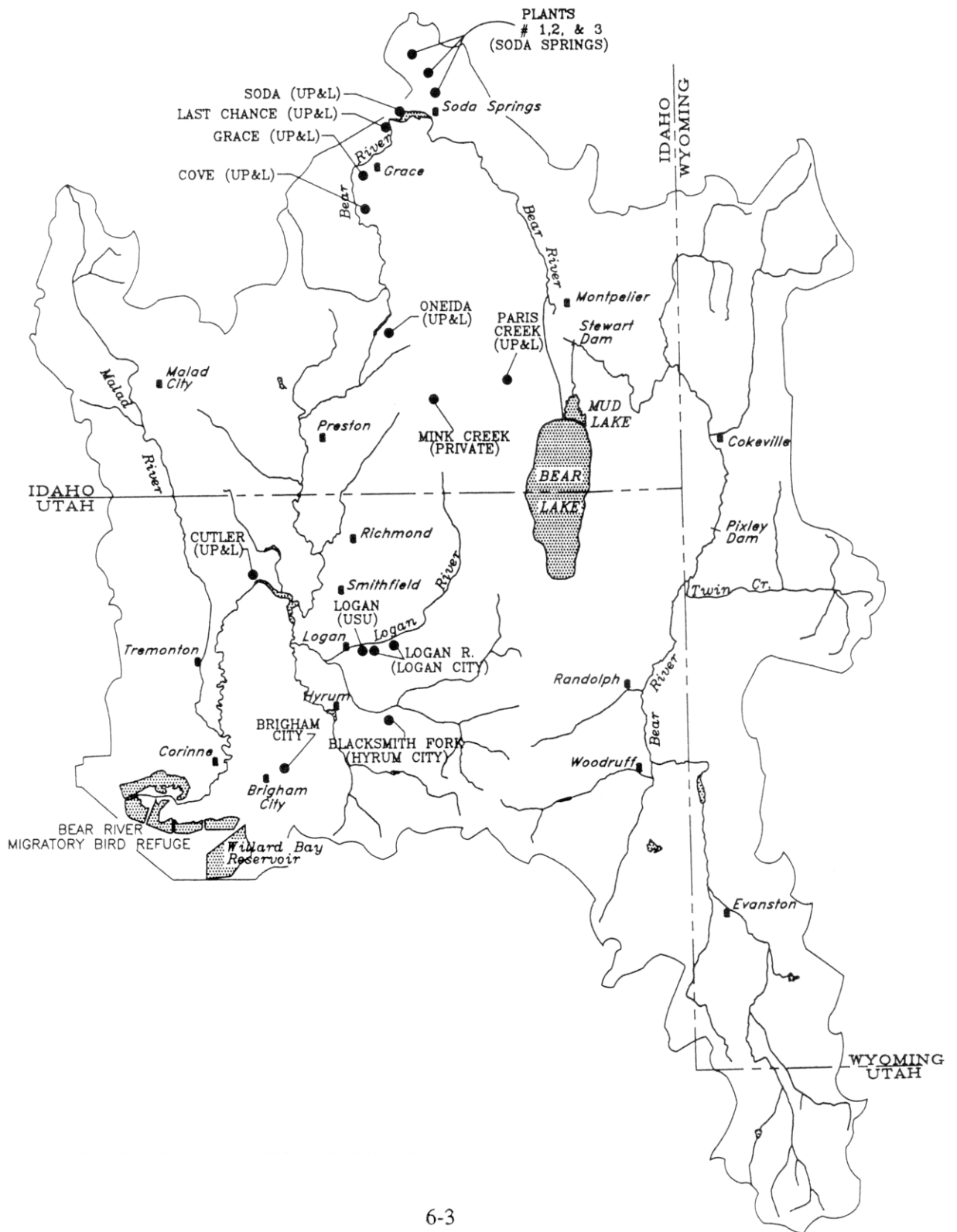
<sup>f</sup>Operated by South Cache Water Users Association.

<sup>g</sup>Operated by Newton Water Users Association.

<sup>h</sup>Owned and operated by St. John Irrigating Co.

FIGURE 6-1

# HYDROELECTRIC POWER PLANTS



that irrigation diversions can be made downstream.

To manage the mainstem flows, UP&L has developed facilities which enable the company to regulate (and use as a reservoir) the top 1.4 million acre-feet of Bear Lake's 6.5-million acre-foot storage volume. To do this, it was necessary to divert the flow of Bear River into Bear Lake, because it does not flow in under natural conditions. Between 1909 and 1918, the Stewart Diversion Dam, the Rainbow Inlet Canal, the Outlet Canal, and the Lifton Pumping Plant were built. The pumping plant was needed to lift water from the lake into the Outlet Canal, which returns the water to the Bear River. Operation of these facilities provides UP&L with controlled storage in Bear Lake through a maximum range of 21.65 feet, which represents 1,452,000 acre-feet of storage.

In accordance with a series of contracts, UP&L provides water for irrigation diversions along the Bear River in Idaho and Utah from Bear Lake down to Cutler Reservoir. The irrigation companies which divert from Bear River under contract with UP&L are given in Table 6-3.

### 6.3 MANAGEMENT OF IRRIGATION SYSTEMS

The existing network of irrigation companies in the basin is extensive. Those irrigation companies listed in Tables 6-4, 6-5, and 6-6 are only the largest of about 205 local companies using the water sources indicated. Although there are small areas irrigated from groundwater (particularly in Cache County), irrigation in the Bear River basin is essentially by surface water.

**TABLE 6-2**  
**EXISTING HYDROELECTRIC POWER PLANTS IN BEAR RIVER BASIN<sup>3&4</sup>**

Plant	Stream	Owner	Static Head (feet)	Installed Capacity (kilowatts)
Soda	Bear River	UP&L	79	14,000
Last Chance	Last Chance Canal	UP&L	40	1,500
Grace	Bear River	UP&L	526	33,000
Cove	Bear River	UP&L	98	7,500
Oneida	Bear River	UP&L	145	30,000
Cutler	Bear River	UP&L	127	30,000
Mink Creek	Mink Creek	Private	430	3,075
Paris Creek	Paris Creek	UP&L	346	650
Logan City	Logan River	Logan City	213	2,000
Logan (State)	Logan River	USU	30	450
Logan City	Logan River	Logan City	99	1,400
Soda Springs #1	Soda Creek	Soda Springs City	50	120
Soda Springs #2	Soda Creek	Soda Springs City	20	50
Soda Springs #3	Soda Creek	Soda Springs City	84	400
Hyrum City	Blacksmith Fork	Hyrum City	76	400
Brigham City	Box Elder C.	Brigham City	580	1,200
<b>TOTAL</b>				<b>125,745</b>

**TABLE 6-3**  
**IRRIGATION CONTRACTS WITH UP&L<sup>5</sup>**

Company	Date of Contract	Amount
<b>IDAHO</b>		
Last Chance Canal Company (24,000 ac.)	1919 <sup>a</sup>	20,000 ac-ft+ supplemental
Thatcher Irrigation Company (1,700 ac.)	1989	Variable
West Cache Canal Company (15,000 ac.) <sup>b</sup>	1919	12,000 ac-ft
Twin Lakes Irrigation Company (12,500 ac.)	1961	5,000 ac-ft
Cub River Irrigation Company (22,300 ac.) <sup>b</sup>	1916	20,000 ac-ft
Individual Pumping Contracts (19 contracts)	1989	Variable
<b>UTAH</b>		
Bear River Canal Company (64,000 ac.)	1912	900 cfs
Individual Pumping Contracts (57, all in Cache County)	1989	Variable
<sup>a</sup> Original contract revised in 1984.		
<sup>b</sup> Includes land in Utah and Idaho		

Management of an irrigation water supply typically includes these responsibilities:

- Planning, construction, and operation of reservoir storage, diversion dams, and delivery systems.
- Conveyance of streamflow diversions and storage releases to irrigated cropland in accordance with water rights.
- Prevention of conveyance losses, excessive return flows, and illegal water use.
- Collection of revenues from water users to meet operation, maintenance and replacement (OM&R) expenses and repay capital costs.
- Continuous, long-term operation and maintenance of project facilities.

#### 6.3.1 Above Evanston

Irrigated land areas above Evanston, Wyoming, are mostly within Wyoming. The main tributaries are Mill Creek, Sulphur Creek and Yellow Creek. Each is managed essentially for the irrigation of pasture and hay. For the most part, managing entities above Evanston are private ranches, of which only a few are in Utah. Within Utah (Summit County), the irrigated area is 2,650 acres, as shown in Table 10-2, which is a detailed breakdown of irrigated land by counties.

#### 6.3.2 Below Evanston, Above Bear Lake

Wyoming's irrigated land in the Bear River Basin is within the two counties, and is above Bear Lake (See Figure 3-1). Most of the Uinta County portion is situated above Evanston, Wyoming.

Uinta County, Wyoming  
27,000 acres (approximately)

Lincoln County, Wyoming  
33,000 acres (approximately)

Idaho has about 22,000 acres of land irrigated by diversions from the Bear River and its tributaries above Stewart Diversion Dam. Also, about 13,000 acres of land in Idaho is irrigated by streams flowing directly into Bear Lake, mostly along the northwest shoreline.

The remaining 73,400 acres of irrigated land above Bear Lake is within Utah's Rich County, where water supplies are managed by at least 35 irrigation companies or other entities. Storage regulation for management of water supplies in Utah is provided by the following five reservoirs.

Woodruff Narrows	57,300 AF
Neponset	6,900 AF
Woodruff Creek	4,200 AF
Birch Creek	2,260 AF
Little Creek	980 AF

About 15 companies manage flows diverted from the mainstem of Bear River. About 20 companies (or private entities) manage water supplies diverted from tributary streams. A few of the larger companies are listed for reference in Table 6-4.

#### 6.3.3 Irrigated Land in Idaho

Within Idaho's portion of the Bear River Basin, the estimated 190,000 acres of irrigated land (See Table 10-1) is managed by at least 90 irrigation companies. The Idaho area of main interest for this report is below Oneida Dam in Franklin County (Idaho). About 12 irrigation companies manage the water supply

in Franklin County. Several of the canals and irrigation systems in this area extend beyond the state line into Utah. Oneida Dam and Reservoir is operated for hydropower generation only. Eleven storage reservoirs on five tributary streams are operated for irrigation. The seven largest provide a combined storage capacity of 46,150 acre-feet (Table 6-1).



Cache County - Div. of Water Resources

#### 6.3.4 Cache County, Utah

In Cache County, an average annual water supply of about 377,100 acre-feet for nearly 120,000 acres of irrigated land is managed by more than 70 irrigation companies. Possibly as much as 8,000 acres are irrigated with groundwater. Because the irrigation systems are numerous and complex, they are grouped in Table 6-5 by subareas, in clockwise order around Cache Valley.

**TABLE 6-4**  
**RICH COUNTY IRRIGATORS<sup>1, 8</sup>**

Company	Water Source	Irrigated Area (acres)
Randolph & Woodruff Canal Co.	Bear River	10,200
Randolph & Sage Creek Canal Co.	Bear River	8,580
Beckwith-Quinn-West Side Canal Co. (a.k.a. Beckwith-Quinn Canal Co.)	Bear River	5,650
Chapman Canal Deseret Livestock Co. (a.k.a. Chapman Canal Co.)	Bear River and Saleratus Creek	5,030
Crawford-Thompson Irrigation Co.	Bear River	4,050
Utah Woodruff Narrows Reservoir Co.	Bear River	2,200 <sup>a</sup>
Woodruff Irrigation Co.	Woodruff Creek	4,840
Randolph Irrigation Co.	Big Creek	3,400
Rich County Otter Creek Irrigation Co.	Otter Creek	1,380
Meadowville Canal Co.		1,190 <sup>b</sup>
Laketown Irrigation Co.	Laketown Creek	1,090
Hodges Irrigation Co.	Swan Creek	1,000
Little Creek Reservoir Co.	Little Creek	1,000
Others (not listed)		23,440
Total		73,400

<sup>a</sup>Supplies supplemental irrigation water to about 30,000 acres of land irrigated by other companies listed in this table.

<sup>b</sup>Meadow, Jebo, and Tuff creeks.

Irrigation management in Cache County is enhanced by the operation of three reservoirs. Porcupine, Hyrum, and Newton reservoirs provide 37,000 acre-feet of storage (See Table 6-1). No irrigation reservoir storage on the Logan River, Blacksmith Fork, or in the Smithfield- Richmond area. This requires irrigation companies to rely on natural stream flows and/or groundwater.

#### 6.3.5 Malad River in Idaho

The Malad River joins the Bear River in Box Elder County, Utah. Because of poor water quality below the Idaho-Utah state line,

most of the land irrigated from the Malad River is in Oneida County, Idaho. About 10 irrigation companies serve more than 15,000 acres in Oneida County. Four reservoirs provide about 26,000 acre-feet of water storage.

#### 6.3.6 Box Elder County, Utah

Table 10-2 shows 105,800 acres of irrigated land in the Box Elder County portion of the Bear River Basin. Included in this total is a significant area of subirrigated pasture; approximately 11,070 acres. More than 1,600 acres of other land are irrigated from local groundwater, and another 7,200 acres of land



**TABLE 6-5**  
**CACHE COUNTY IRRIGATORS<sup>1&8</sup>**

Company	Irrigated Area (acres)
Lewiston/Clarkston Area	
Cub River Irrigation Co. (Utah only)	14,600
West Cache Irrigation Co. (Utah only)	11,250
Newton Water Users Assoc.	2,600
Richmond/Smithfield Area	
Richmond Irrigation Co.	8,380
Smithfield Irrigation Co.	2,900
Logan River Area	
Logan & Northern Irrigation Co.	3,340
Logan, Hyde Park, & Smithfield Canal Co.	2,810
Benson Irrigation Co.	2,650
Blacksmith Fork Area	
Nibley-Blacksmith Fork Irrigation Co.	2,800
Hyrum - Blacksmith Fork Irrigation Co.	2,400
Little Bear River/Wellsville Area	
Hyrum - Mendon - Wellsville Irrigation Co.	7,090
Porcupine Highline Canal Co.	2,870
Wellsville East Field Irrigation and Canal Co.	2,780
Others (not listed)	53,430
Total	119,900 <sup>a</sup>

<sup>a</sup>See Table 10-2

are partially or completely served by water from the Weber River Basin.

More than 100 irrigation companies or private entities manage the 343,700 acre-feet/year of water supply. Most of these irrigators receive their water from the Bear River Canal Company, the largest irrigation company in the entire Bear River Basin. It provides water to 64,000 acres or more. Its system consists of 120 miles of canals

and laterals, supplying irrigation water to sub-companies, small groups, and individual farmers. Fifty-three of the largest companies irrigate a total of 21,600 acres, and the remaining area of 42,400 acres is irrigated by numerous individual farmers and small groups of irrigators. The Bear River Canal Company's diversion is at Cutler Reservoir. Some of Box Elder

County's many irrigation systems are listed in Table 6-6.

#### 6.4 MANAGEMENT OF MUNICIPAL AND INDUSTRIAL WATER SYSTEMS

There are 52 community water systems in the Utah portion of Bear River Basin, which provide water of culinary quality to essentially all of the basin's 108,000 residents. These systems are managed for the most part by the communities or by mutual non-profit water companies. Management consists of

development of a source, construction and maintenance of some type of conveyance facilities, water purification treatment (if needed), periodic sampling, compliance with other Utah Department of Environmental Quality requirements, distribution to local users, collection of revenues, repayment of capital costs, and payment of operation, maintenance, and replacement costs. These management responsibilities must be carried out in such a way that the water system complies at all times with specified public health regulatory standards enforced by the Utah Drinking Water Board. Sections 11

**TABLE 6-6  
BOX ELDER COUNTY IRRIGATORS<sup>1</sup>**

Company	Irrigated Area (acres)
Bear River Canal Co. (and subgroups)	64,000
Water Imported from Ogden & Weber Rivers	
Pineview Water System	2,300
Cook-Porter Group	530
Others (not listed)	70
Subtotal (approx.)	2,900
Local Streams, Local Groundwater, and Imported Flow <sup>a</sup>	
Box Elder Creek Water Users Assoc.	1,200
Willard Water Co.	1,170
North Field Irrigation Co.	750
Perry Irrigation Co.	420
North Willard Irrigation Co.	200
West Field Stream	200
Mantua Irrigation Co.	710
Cold Springs Dam & Irrigation Co.	340
North String Irrigation Co.	200
Others (not listed)	33,710
Subtotal (approx.)	38,900
Box Elder County Total	105,800

<sup>a</sup>Imported flow in addition to that identified in second group.

and 18 discuss in detail the present use of municipal and industrial water, as well as future needs.

## 6.5 MANAGEMENT OF WATERFOWL AREAS

The Bear River Migratory Bird Refuge is managed by the U.S. Fish and Wildlife Service. The water supply source for the bird refuge is the Bear River. Existing facilities allow flows of the Bear River to be diverted into the managed area and released to the Great Salt Lake. By maintaining somewhat stable levels of fresh water in the ponds through part of the year, with a healthy growth of marsh vegetation, the refuge has for many years supported great numbers of waterfowl with food and nesting protection. In addition to the Bear River Migratory Bird Refuge, two state-managed waterfowl areas are near Great Salt Lake. The Salt Creek State Waterfowl Management Area is six or seven miles

southwest of Tremonton. The State Public Shooting Grounds area is closer to Great Salt Lake on the south. Each area includes 3 or 4 large fresh-water ponds, some of which are controlled by levees. The water supply for both state-managed areas is Salt Spring, west of Tremonton, and other springs further south. Management objectives are to maintain an optimum, stable water surface in the ponds, and promote a maximum of vegetation. Both are managed by the Utah Division of Wildlife Resources.

Also, nearly 20,000 acres of marshland and ponds along the shoreline of Great Salt Lake in Box Elder County are managed by nine privately owned duck clubs. The names and sizes of these clubs are shown in Table 6-7. Water control facilities in these areas are believed to be minimal or non-existent.

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**TABLE 6-7**  
**PRIVATELY OWNED DUCK CLUBS**

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Name of Club	Acreage Managed <sup>6</sup>	Location
Bear River Club	9,600	Bear River Delta
Chesapeake Duck Club	2,900	Bear River Delta
Duckville Club	1,200	Bear River Delta
Knudson's Duck Club	3,000	West of Brigham
Pioneer Duck Club	1,200	South of Corinne
Sagebrush Club	1,000	West of Corinne
Sweet Grass Gun Club	156	South of Corinne
Widgeon Club	160	South of Corinne
Willard Bay Gun Club	320	Willard Bay
Total	19,536	

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## 6.6 CLOUD SEEDING

Winter cloud seeding for augmentation of mountain snowpack is an accepted program in the

water supply management community. Some projects in the Western United States have been operated continuously for more than 30 years. This relatively long

experience indicates that increases of 5-20 percent in seasonal precipitation can be achieved.

In the Bear River Basin, a winter cloud seeding program that began in the fall of 1988 is continuing. The operational period is November 15 to April 15 each year. Costs are shared by the state and local governments. The estimated increase in precipitation has been about 1.48 inches, or approximately 12 percent.<sup>7</sup> (Note: these percentages relate to the cloud seeding year, not an average year. Thus, in a below-normal year of 70 percent precipitation, for example, a 12-percent increase would raise the annual total only to 78 percent of normal).

Additional runoff resulting from cloud seeding operations does not necessarily correspond with additional precipitation, because watershed conditions and other factors are involved. Although the amount of augmented runoff in the Bear River Basin is difficult to quantify with accuracy, the results have been adequate to justify the continuing costs. The probable cost of additional runoff is about \$2 to \$5/acre-foot. The UP&L has conducted cloud seeding in the Thomas and Smiths Fork drainages (upstream from Bear Lake) periodically since 1961. In most cases, full use of the additional runoff can be achieved only by expanded storage regulation.

Summer rainfall augmentation during the agricultural growing season is more complex, and the record of operational experience is shorter. Nevertheless, researchers in this field consider the prospects to be favorable. Because of the large area of cropland in the Bear River Basin, and particularly the dry

cropland, summer rainfall augmentation could be especially valuable. During six consecutive years (1976-81), an experimental summer cloud seeding program was conducted in the Bear River Basin. The objective was to investigate the possibility of increasing summer rainfall (June - September) and suppressing hail. Further research is needed to better evaluate average capability, seasonal dependability, and probable costs.

## 6.7 MANAGEMENT PROBLEMS AND NEEDS

Within the limits of existing facilities for streamflow regulation, the Bear River Basin is



Cloud Seeding Research Aircraft - Div. of Water Resources

well managed. Improvements, however, are encouraged wherever possible. The Bear River Basin Plan does not suggest any change in existing management organizations, although additional organizations may be necessary in the future as new Bear River development occurs. Where new project operations would affect existing operations or facilities, new operating agreements to protect each party may be required.

Managers of public water supply systems in the basin have several difficult problems to resolve in the next few years, including expansion of systems for new population growth, replacement of deteriorating facilities, and adjustment to more stringent public health standards. Section 11 discusses these in more detail.

The most pressing management needs at the Bear River Migratory Bird Refuge are to repair the flood damage created by several years of extremely high lake levels in the early 1980s, and to re-establish the vegetation. The U.S. Fish and Wildlife Service is currently addressing these needs. Water supply needs of the refuge are discussed in Section 14.

## 6.8 RECOMMENDATIONS

Utah Power & Light Company, irrigation companies, municipal and industrial water users, waterfowl and wildlife agencies, and other water management entities in the Bear River Basin should continue to operate and manage their respective systems to obtain efficient use of existing water resources with minimum interference to other systems and users.

Continuous communication and cooperation between water management entities is a strong influence toward greater efficiency of use and protection against potential shortages. Therefore, more emphasis on both communication and cooperation is encouraged and recommended.

## 6.9 REFERENCES

In addition to references listed below, Section 6 of the Utah State Water Plan, January 1990, discusses management of water in Utah, and four issues concerning ways to improve water resource management.

1. "Irrigation Conveyance Systems," Working Paper for Bear River Basin Type IV Study, U.S. Dept. of Agriculture, April 1976.
2. "Existing and Potential Reservoirs," Working Paper for Bear River Basin Type IV Study, U.S. Department of Agriculture, February 1976.
3. "Summary of Bear River Operation," Utah Power and Light Co. (Carly Burton), February 19, 1988.
4. "Wasatch Front Total Water Management Study," U.S. Bureau of Reclamation and Utah Division of Water Resources. February 1990.
5. Letter from Utah Power and Light Co. (Carly Burton). June 21, 1990.
6. Letter from U.S. Fish and Wildlife Service (Clark D. Johnson, Assistant Field Supervisor), June 4, 1990.
7. "Summary of Operations (1991 water year) and Evaluation of A Cloud-Seeding Program In Northern Utah (Box Elder, Cache, and Rich Counties)," North American Weather Consultants, August 1991.
8. "Water Companies in Utah," Utah Division of Water Rights, 1990.